STATE OF NEW HAMPSHIRE
INTRA-DEPARTMENT COMMUNICATION

FROM: William J. Oldenburg, P.E.
Administrator

DATE: November 1, 2013
AT (OFFICE): Bureau of Highway Design

SUBJECT: REVISED Guidelines for the Installation of Milled Rumble Strips

TO: Department Bureaus
Department Consultants

MEMORANDUM

Transmitted herewith is a copy of the recently revised "Guidelines for the Installation of Milled Rumble Strips on New Hampshire Highways", dated September 9, 2013. It was noted that the previous rumble strip installation guidelines unnecessarily limited the use of rumble strips on roadways that would otherwise be good candidates for their use and the revisions allow for a more systemic approach to installations statewide. The intent of this document is to provide the Department's designers and contract administrators with guidance in the placement of rumble strips along the shoulders and centerlines of New Hampshire roadways. The current Standards will be revised to reflect these new guidelines.

The revised Guidelines were developed with input from the Bureaus of Highway Design, Construction, Traffic, Highway Maintenance, Rail & Transit, Environment, and the Federal Highway Administration. It is the intent to implement this guidance immediately into roadway projects and post this document on the NHDOT Internet website.

Please contact me with any questions you may have regarding this issue.

February 5, 2008
Revised September 9, 2013

NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

RUMBLE STRIP INSTALLATION GUIDELINES

The following are guidelines established for the use of milled rumble strips/stripes along New Hampshire roadways. Run off the road (ROR) crashes and head-on collisions due to fatigued, inattentive, or otherwise impaired drivers are a major contributor to New Hampshire's fatal and injury crashes. Rumble strips are placed as a countermeasure for driver error, rather than roadway deficiencies. Milled shoulder rumble strips/stripes and milled centerline rumble stripes (CRS) provide low-cost highly effective safety solutions that alert drivers when they drift from their travel lane, providing an opportunity for the driver to maneuver their vehicle back into the proper travel way. Another benefit of shoulder rumble strips/stripes is that they alert pedestrians and bicyclists of possible danger from errant vehicles that leave the travel way and enter the shoulder area. Because of their proven significant safety benefits at a relatively low cost (NCHRP Synthesis Report 641), a project specific cost to benefit analysis will not be required for these countermeasures to be Highway Safety Improvement Program funded.

General Design Guidelines for the Installation of Milled Rumble Strips/Stripes on New Hampshire Highways

Milled Shoulder Rumble Strips (SRS) will be installed on all Interstate Highways, and similarly Limited Access divided highways to reduce the number of run off the road crashes. Milled SRS should also be considered on roadway segments and corridors with the following characteristics:

1. Posted speed limit of 40 MPH or greater.
2. Minimum of 6' wide shoulders.

Rumble "Stripes" will generally not be installed on Interstate or similar Limited Access highways, but may be used on median side shoulders or other facility types where determined advantageous by the Department.

- Milled Centerline Rumble Strips/Stripes (CRS/S) will be considered on an individual project-by-project basis to reduce the number of crossing the centerline road crashes. Milled CRS/S should be considered on roadway segments and corridors with the following characteristics:

    1. Posted speed limit of 40 MPH or greater.
    2. Pavement width of 28'or greater
    3. Existing pavement in good condition and minimum wearing course depth of 1 ¼ inches (so that the installation of CRS will not accelerate pavement delamination and deterioration of the centerline pavement joint).

A public informational meeting will be held within the affected communities.

Specific Design Guidelines for the Installation of Milled Rumble Strips/Stripes on New Hampshire Highways

Installation procedures for Milled Shoulder Rumble Strips (SRS) on Interstate and similarly Limited Access divided highways:

Right Side Shoulders

- Depth shall be 1/2 inch
- Width shall be 16"
- Location shall be 30" from the outside of the edge line
- SRS shall not be installed on bridge decks.
- Terminate SRS 30' before at grade bridges and begin them 30' after. (This eliminates conflicts with at grade approach slabs.)
- Install SRS on fill over bridge structures

Ramp starting and stopping locations

Off ramps: Terminate SRS when the shoulder either gets narrower than 6' or at the beginning of the concrete nose

Mainline: Begin at concrete nose for off ramp
Terminate at end of concrete nose for on ramp

On ramps: Begin at end of the concrete nose as long as the shoulder is wider than 6' throughout the length of the acceleration lane

Note: At cloverleaf interchanges that have high volume and the acceleration lane is also the deceleration lane, consideration should be given to start the SRS 500' to 1000' beyond the off ramp nose

Note: If the ramp continues as a multi-lane roadway beyond the nose, consideration should be given during the design phase to extend SRS beyond the nose.

Left Side Shoulders (Median side)

- Depth shall be 1/2 inch
- Width shall be 16"
- Location shall be directly beneath the edge line with the remaining 10" extending into the shoulder area.

Median Crossovers (Starting and Stopping locations)

- When SRS are 30" off the edge line (shoulders greater than 6') terminate SRS 50' before and begin SRS 50' after.
- When the SRS are 6" off the edge line (shoulders 6' & less) terminate SRS 130' before and begin SRS 50' after.

Installation procedures for Milled Shoulder Rumble Strips/Stripes and Centerline Rumble Strips/Stripes on NHS and other undivided 2-lane or 4-lane roadways:

Shoulder Rumble Strips/Stripes (SRS)

- Depth shall be 1/2 inch
- Width shall be 12"
- Location shall be either 12" from the outside of the edge line or directly beneath the edge line with the remaining 8" extending into the shoulder area
- Where bicycle traffic is anticipated;
  - Provide a minimum 4' clear area from rumble strip/stripe to edge of pavement.

- Provide a minimum 5' clear area from rumble strip/stripe where vertical obstructions are present (guardrail & curbing).
- Provide gaps of 12' in the shoulder rumble strips/stripes every 48' unless other breaks for major drives or sideroads are provided.

Intersections, drives and climbing lanes – starting and stopping locations

- If the highway has on and off ramps, terminate SRS at the edge line taper point
- Where right turn lanes exist – terminate at the beginning of the edge line taper of the turn lane
- Where no right turn lane exists - terminate SRS 300' before pavement radius of the side road
- Where no left turn lane exists (but many vehicles make this movement), terminate SRS 300' before the pavement radius of the side road.
- Begin SRS 150' after the radius of the side road
- At major commercial drives, use the guidelines noted above
- SRS will run by single resident & field driveways
- For truck climbing lanes, terminate SRS at the beginning of the edge line taper, unless the shoulder maintains a minimum width of 8'. Begin SRS when the edge line tapers back to normal and the shoulder has a minimum width of 8'.
- SRS will not be placed on segments of roadway that have more than 5 side roads and/or major commercial drives in a one-mile segment.

Note: Design should also take into consideration whether they should be installed in residential areas.

Centerline Rumble Strips/Stripes (CRS)

- Depth shall be 1/2 inch (passing zones included)
- Width shall be 12"
- Location shall be directly under the centerline

Intersections with no turn lanes or painted islands - starting and stopping locations

- Terminate CRS 25' before the end of the double yellow centerline
- Begin CRS 25' after start of the double yellow centerline

Intersections with raised islands - starting and stopping locations

- When approaching an island and at the point where the double yellow lines diverge, the CRS shall continue along the left double yellow line and terminate 25' before the end of the double yellow. If the double yellow becomes a single yellow terminate 25' before that point

Intersections with left turn lanes - starting and stopping locations

- Terminate CRS 25' before the end of the double yellow.
- Begin CRS 25' after the start of the double yellow.

Intersections with Painted Islands - starting and stopping locations

- At the point where the painted island starts (double yellow lines diverge), CRS shall only continue along the left double yellow line and terminate 25' before the end of the double yellow.

Installation procedures for Milled Transverse Rumble Strips:

- Rumble strips shall have a finished dimension of 4 inches (+/- ½ inch) wide in the direction of travel and a minimum of 11 feet long measured perpendicular to the direction of travel. The depressions shall have a trapezoidal shape with a maximum 3/8 inch depth. Rumble strips shall be placed in relation to the roadway according to the patterns shown on the plan.